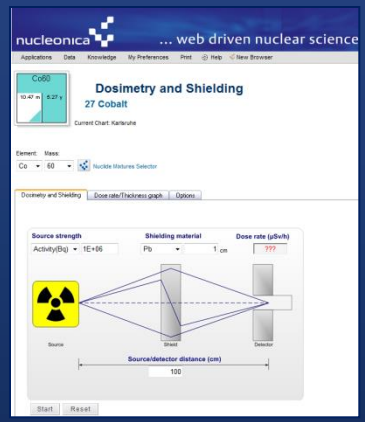
A 1.5 h course to be held at the JRC Ispra at the 5th International Summer School 2013:
*Operational Issues in Radioactive Waste Management and Nuclear Decommissioning*

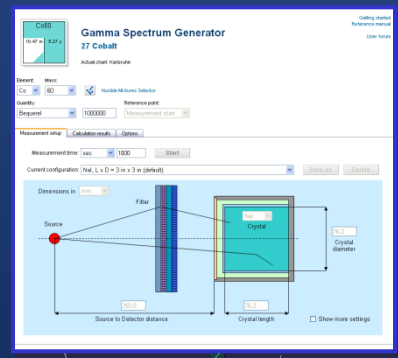
# Nucleonica "Lab": An Overview of the Nuclear Science Portal with "hands-on" exercises

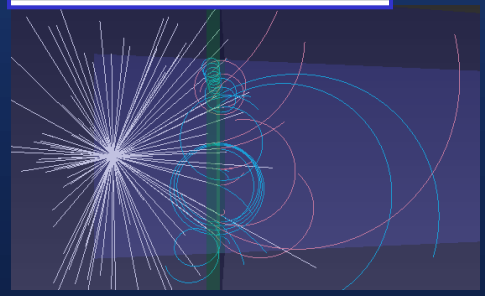
Dr. Joseph Magill,
Nucleonica GmbH,
Karlsruhe

# Nucleonica: Web-based Software Tools for Simulation and Analysis

- Nuclear Data Resources in Nucleonica
- Nuclear Science Applications & Tools
  - Decay Engine
  - Dosimetry & Shielding
  - Virtual Cloud Chamber
  - Gamma Spectrum Generator
  - webKORIGEN
  - *e*-Ship
- Education & Training with Nucleonica
  - Nucleonica Mobile
  - Karlsruhe Nuclide Chart
- Knowledge Management with Nucleonica



These lectures are available online:
http://www.nucleonica.com/wiki/index.php?title=Training_Course_Proceedings

Links to the presentations:

- go to wiki on main Nucleonica page

- click on Training Courses

- at bottom of page click on Training Course Proceedings

## Previous Training Courses

### Sept. 2013 Ispra, Italy

**Nucleonica "Lab": An Overview of the Nuclear Science Portal with "hands-on" exercises at the 5th International Summer School 2013 - *Operational Issues in Radioactive Waste Management and Nuclear Decommissioning*, Ispra 9-13 Sept. 2013.**

This year, the Ispra summer school is organised around several technical sessions and will feature five visits to JRC-ISPRA's laboratories that are involved in decommissioning and nuclear and radioactive waste management. During these visits, participants will be invited to assist in some real measurements. The Nucleonica training sessions will form one such "laboratory" where participants can learn how to use Nucleonica applications effectively in this area. During the course of the week, four 1.5 h Nucleonica "lab" sessions will be held each afternoon.

JRC Ispra: location of the 5th International Summer School 2013: *Operational Issues in Radioactive Waste Management and Nuclear Decommissioning*

Links to the presentations:

Nucleonica Overview (J. Magill)

Case Study: Characterisation of an Irradiated fuel sample (UOX) from a PWR

A: Calculate the activities of actinide and fission products in the sample (webKORIGEN)

B: Create a nuclide mixture of the 10 nuclides with highest activities (Nuclide Mixtures)

C: Estimate the gamma dose rate from this material – both unshielded and shielded (Dosimetry & Shielding)

D: Generate the gamma spectrum for a HPGe detector (Gamma Spectrum Generator) and identify the main lines.

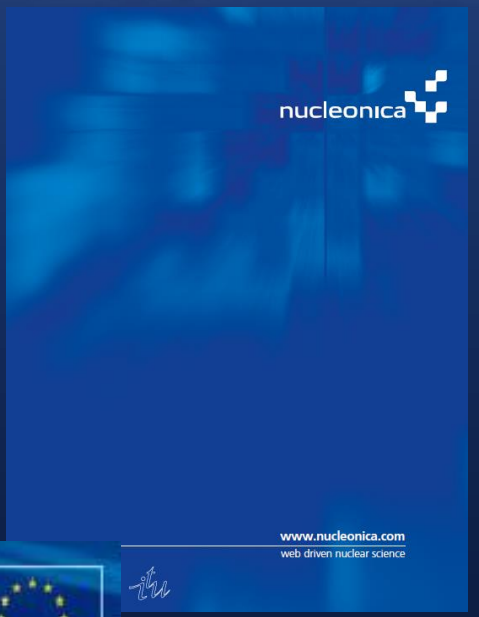
E: Generate a transport report to determine which type of packaging is required to transport this sample (e-Ship)

Nucleonica Tips & Tricks (J. Magill)

Nucleonica brochure

# How can Nucleonica help you?

- Nucleonica provides you with user friendly access to the latest reference data from internationally evaluated nuclear data.
- A unique feature is the wide range of validated web-based nuclear science applications for decay calculations, dosimetry & shielding, gamma spectrometry, etc.
- In addition Nucleonica offers a range of introductory and advanced training courses in various areas of nuclear science.

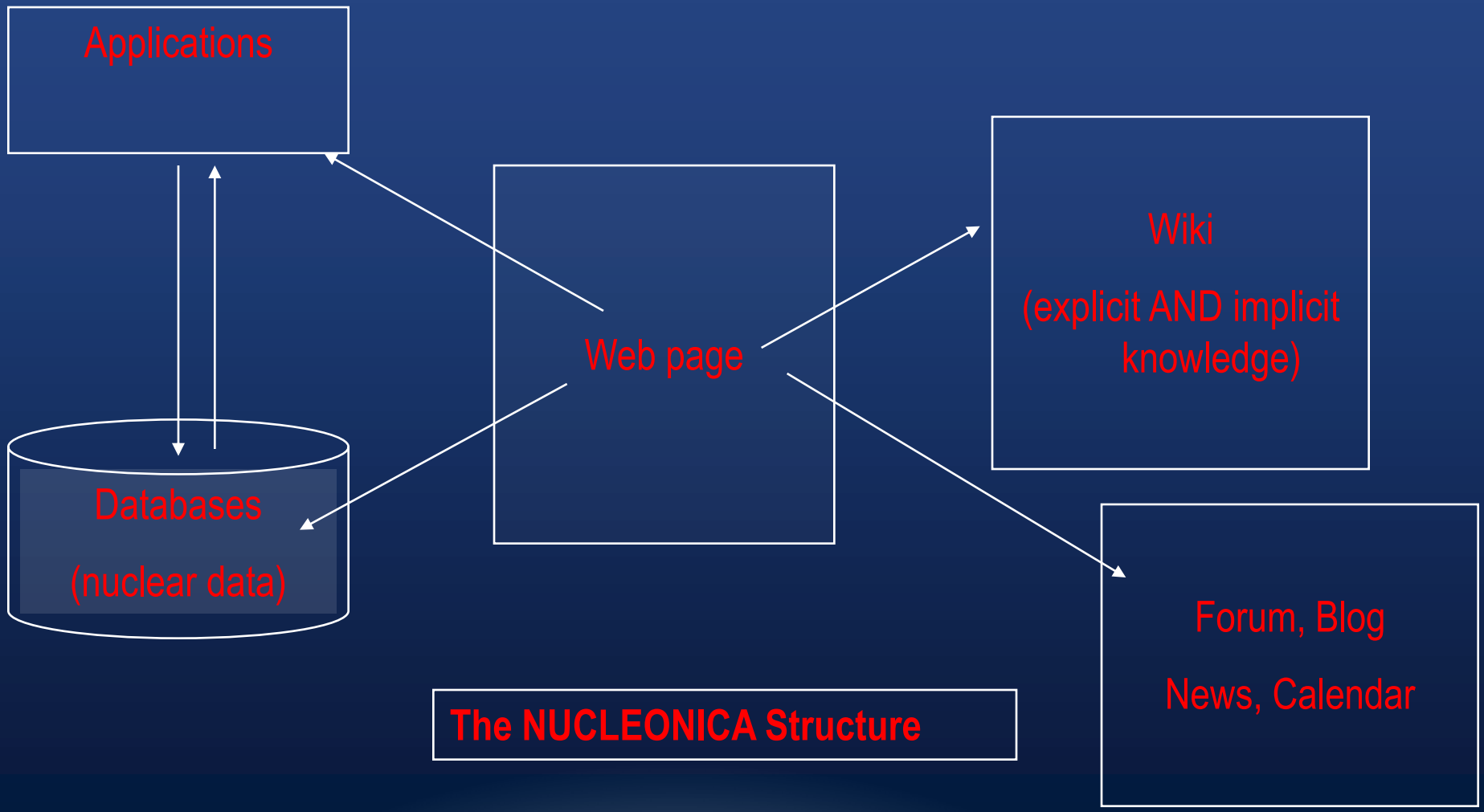



CERN · PAUL SCHERRER INSTITUT PSI · TRIUMF · Bundesamt für Strahlenschutz · JÜLICH FORSCHUNGSZENTRUM · SCK·CEN · WAK · HZB Helmholtz Zentrum Berlin · CEZ GROUP

Nucleonica is already being used by thousands of scientists and students worldwide in over 92 countries. Due to its advanced IT features, user friendly and intuitive environment, the platform has recently been endorsed by the Sustainable Nuclear Energy Technology Platform (www.snetp.eu):

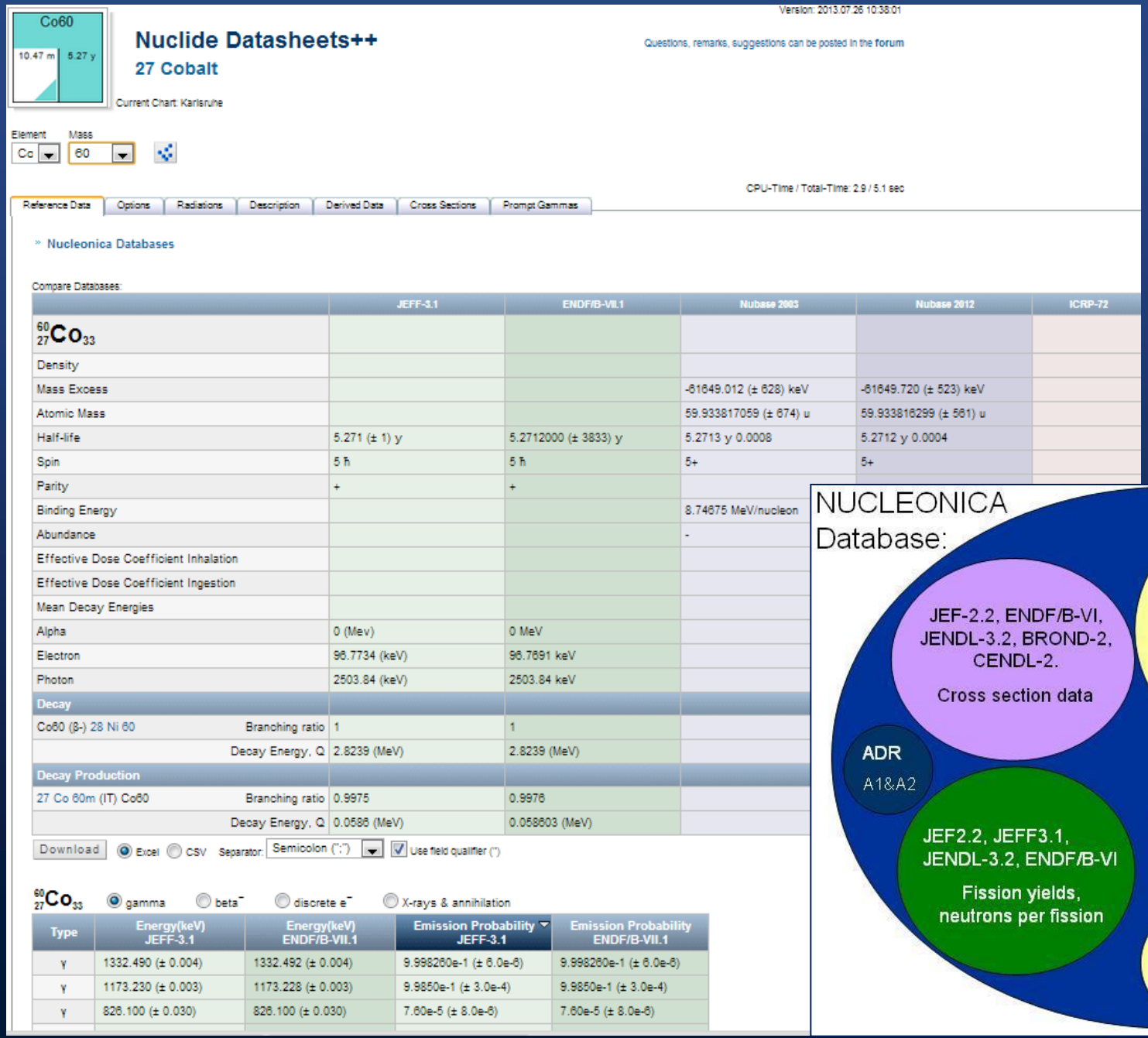

*"Nucleonica plays … an important role in making nuclear education more attractive and in building nuclear knowledge for a new generation of engineers and scientists"*

# Nucleonica Architecture & Logical Structure…

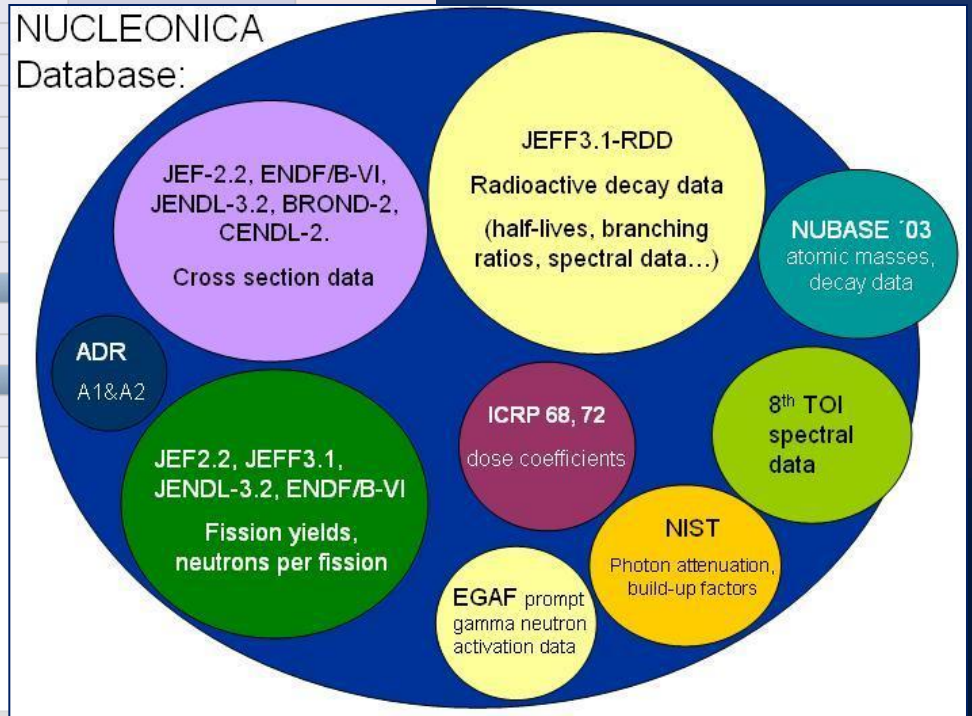



**The NUCLEONICA Structure**

# Nuclear Data Resources in Nucleonica: Nuclide Datasheets++




Main Nucleonica database JEFF3.1 contains decay data on 3852 nuclide.



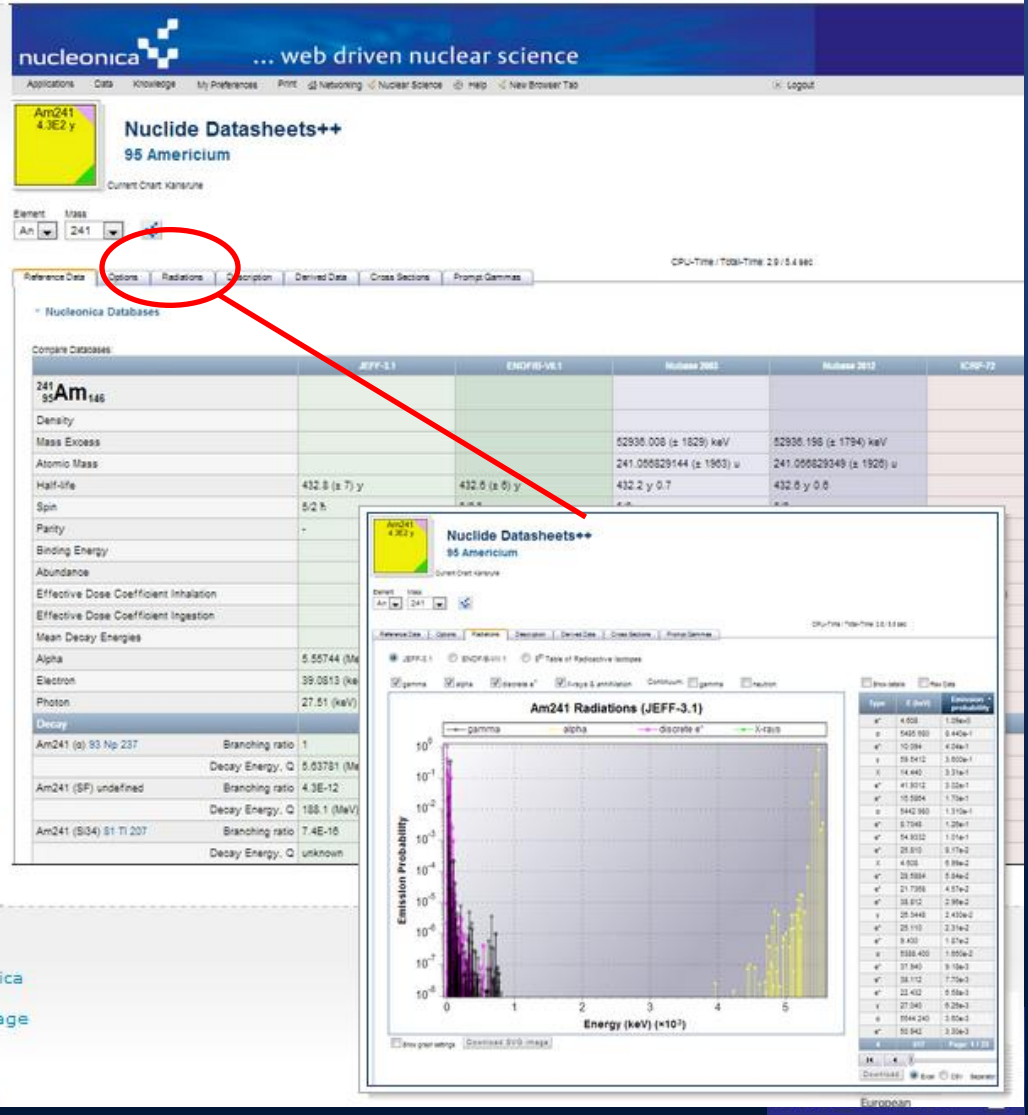
Nuclear Data Resources in Nucleonica:

Nuclide Datasheets++

nucleonica ... web driven nuclear science

## User friendly access to internationally evaluated nuclear data with Nucleonica's Nuclide Datasheets++

- Nuclide Datasheets++ is an innovative user-friendly web-based application for displaying nuclear decay data from internationally evaluated data libraries such as JEFF3.1, ENDF/B-VII.1, etc. Through the use of filters, different types of spectral data (gamma, alpha, beta, etc.) from different sources can be compared.
- It is aimed at professionals for fast lookup of relevant nuclear data. Nuclide Datasheets++ is particularly suitable for education and training of young scientists, engineers and technicians in the nuclear domain.
- Datasheets++ is ideal for physicists, chemists, and technical experts from the nuclear industry, nuclear research organizations, universities, regulatory authorities and nuclear medicine institutes. It can be used in the fields of radiation protection, health physics, radiochemistry, nuclear waste characterization, decommissioning, nuclear security, nuclear forensics, nuclear medicine, etc.
- Register now for Free access to test the Datasheets++




Further information...

- More information on Nucleonica
- Nucleonica brochure
- Nuclide Datasheets++ wiki page
- Nucleonica Blog

Contact us at info@nucleonica.com

# Validated Nuclear Science Applications & Tools

# Decay Engine++

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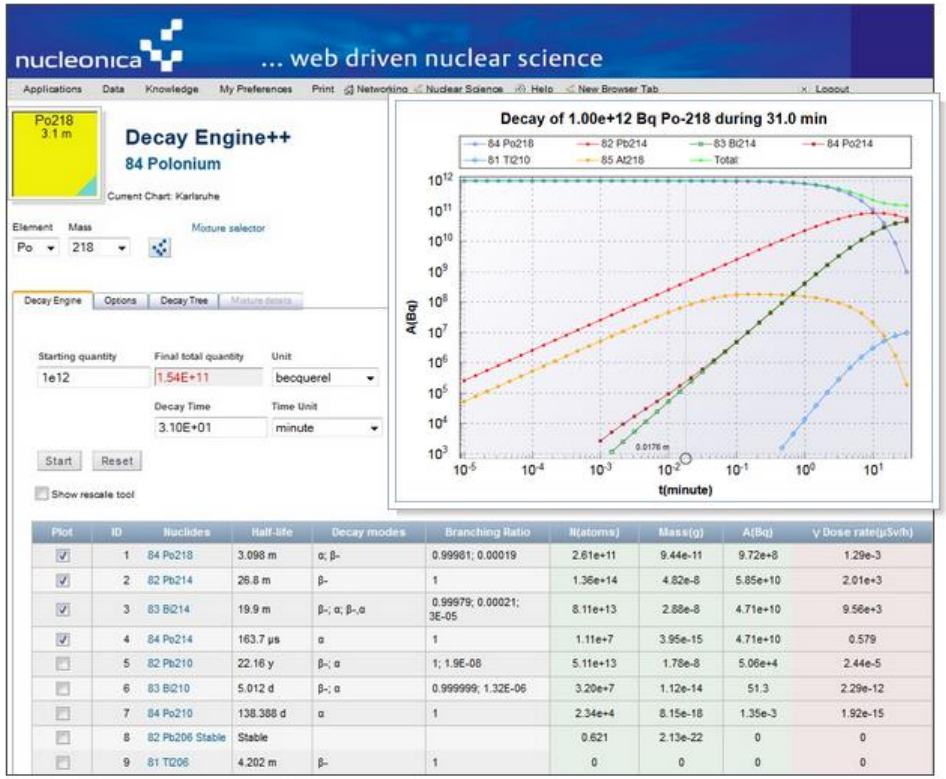
## Radioactive Decay Calculations with Nucleonica's Decay Engine++

» Nucleonica's Decay Engine++ is an innovative user-friendly web-based application for investigating the radioactive decay of nuclides and nuclide mixtures. It is based on the exact mathematical solution to the Bateman equations.

» It is suitable for professionals for everyday calculations and for testing, validating and verifying complex computer models. The Decay Engine++ is particularly suitable for education and training of young scientists, engineers and technicians in the nuclear domain.

» Decay Engine++ is ideal for physicists, chemists, and technical experts from the nuclear industry, nuclear research organizations, universities, regulatory authorities and nuclear medicine institutes. It can be used in the fields of radiation protection, health physics, radiochemistry, nuclear waste characterization, decommissioning, nuclear security, nuclear forensics, nuclear medicine, etc.

» Register now for Free access to test the Decay Engine++




| Plot | ID | Nuclides | Half-life | Decay modes | Branching Ratio | N(atoms) | Mass(g) | A(Bq) | γ Dose rate(μSv/h) |
|---|---|---|---|---|---|---|---|---|---|
| ☑ | 1 | 84 Po218 | 3.098 m | α; β- | 0.99981; 0.00019 | 2.61e+11 | 9.44e-11 | 9.72e+8 | 1.29e-3 |
| ☑ | 2 | 82 Pb214 | 26.8 m | β- | 1 | 1.36e+14 | 4.82e-8 | 5.85e+10 | 2.01e+3 |
| ☑ | 3 | 83 Bi214 | 19.9 m | β-; α; β-,α | 0.99979; 0.00021; 3E-05 | 8.11e+13 | 2.88e-8 | 4.71e+10 | 9.56e+3 |
| ☑ | 4 | 84 Po214 | 163.7 μs | α | 1 | 1.11e+7 | 3.95e-15 | 4.71e+10 | 0.579 |
| ☐ | 5 | 82 Pb210 | 22.16 y | β-; α | 1; 1.9E-08 | 5.11e+13 | 1.78e-8 | 5.06e+4 | 2.44e-5 |
| ☐ | 6 | 83 Bi210 | 5.012 d | β-; α | 0.999999; 1.32E-06 | 3.20e+7 | 1.12e-14 | 51.3 | 2.29e-12 |
| ☐ | 7 | 84 Po210 | 138.388 d | α | 1 | 2.34e+4 | 8.15e-18 | 1.35e-3 | 1.92e-15 |
| ☐ | 8 | 82 Pb206 Stable | Stable | | | 0.621 | 2.13e-22 | 0 | 0 |
| ☐ | 9 | 81 Tl206 | 4.202 m | β- | 1 | 0 | 0 | 0 | 0 |

Further information...

- More information on Nucleonica
- Nucleonica brochure
- Decay Engine++ wiki page
- Nucleonica Blog

Contact us at info@nucleonica.com

European Commission

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Validated Nuclear Science Applications & Tools

Dosimetry & Shielding++

# Radiation dosimetry and shielding calculations with Nucleonica's Dosimetry & Shielding++

» Nucleonica's Dosimetry & Shielding++ is an innovative user-friendly web-based application for investigating the gamma dose rates from radioactive nuclides and nuclide mixtures based on the point source kernel method. More than 1300 gamma and X-ray emitting nuclides with 53,000 gamma and X-rays are available in the Nucleonica database, together with data for ten different shield materials and their associated buildup factors.

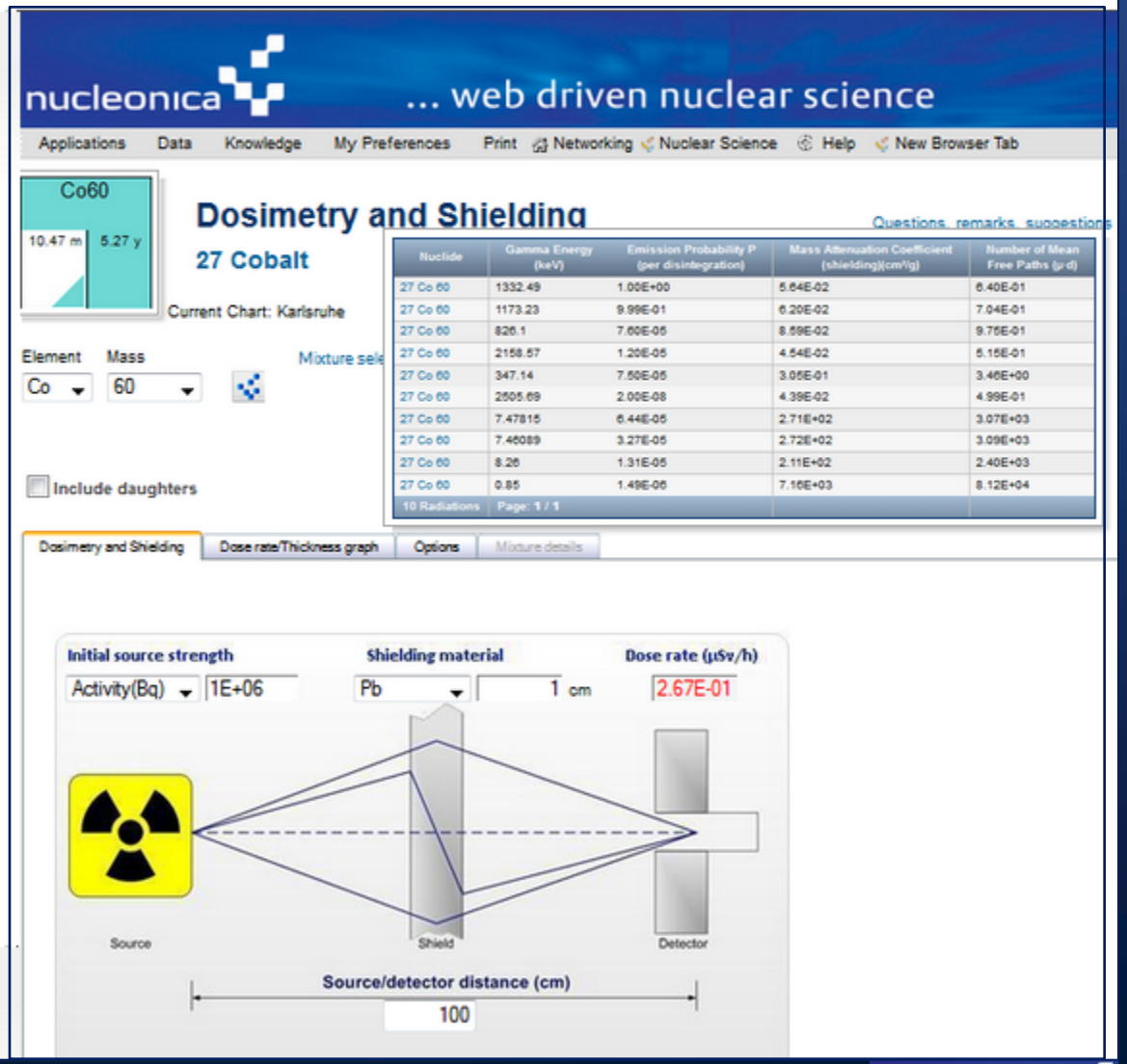
» It is suitable for professionals for everyday calculations and is suitable for education and training of young scientists, engineers and technicians in the nuclear domain.

» Dosimetry & Shielding++ is ideal for physicists, chemists, and technical experts from the nuclear industry, nuclear research organizations, universities, regulatory authorities and nuclear medicine institutes. It can be used in the fields of radiation protection, health physics, radiochemistry, nuclear waste characterization, decommissioning, nuclear security, nuclear forensics, nuclear medicine, etc.

» Register now for Free access to test the Dosimetry & Shielding++

Further information...

- More information on Nucleonica
- Nucleonica brochure




nucleonica

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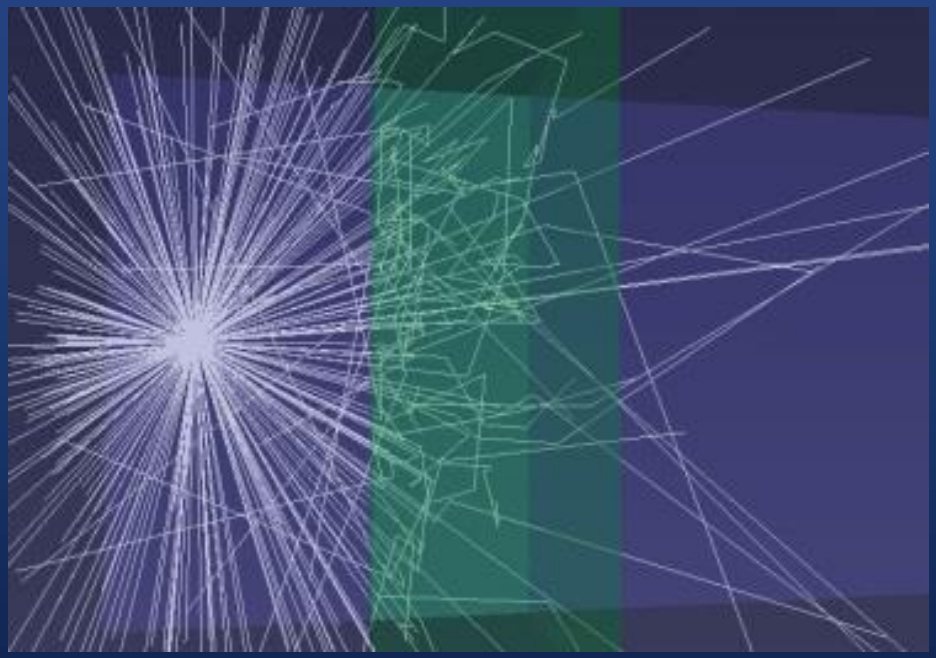
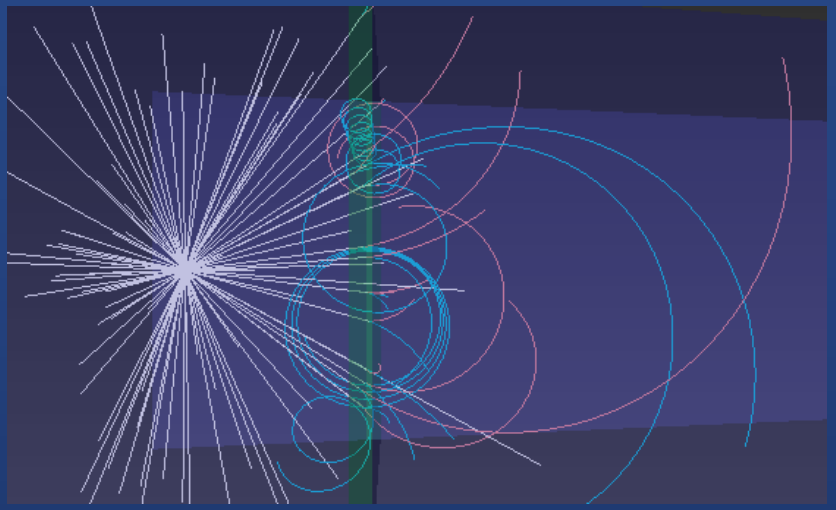
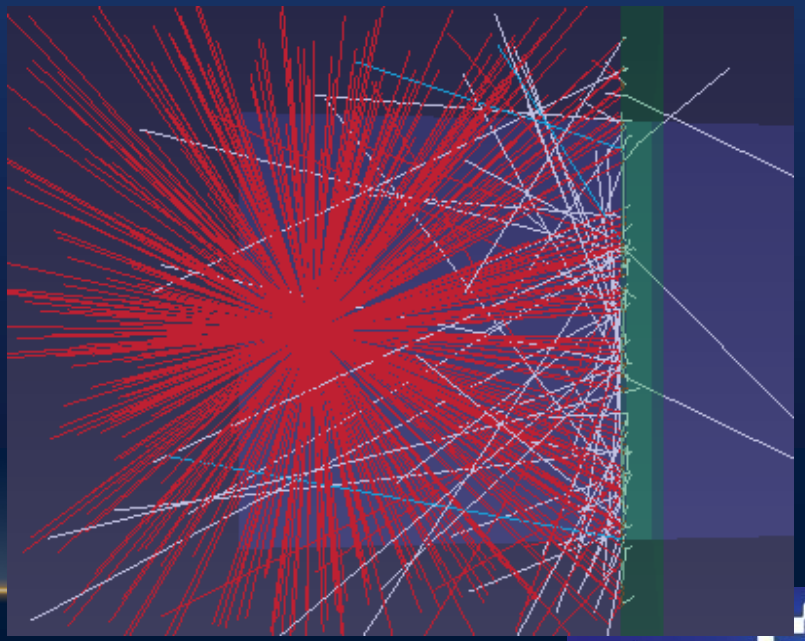
# Virtual Cloud Chamber



low energy photons (energy 100 keV) are attenuated with a thick (15 cm) water shield. This combination of low energies and thick shields give rise to multiple scattering of the radiation



Electron-positron pairs are created using 10 MeV photons on lead. By “switching off” energy loss mechanisms, the charged particles are seen to spiral in the applied magnetic field.



The red particles (3 MeV positrons) are blocked by a lead shield (green). When the positrons collide with the shield, they combine with electrons (blue) to create gamma radiation (white). Only a few gamma photons pass through the shield material.

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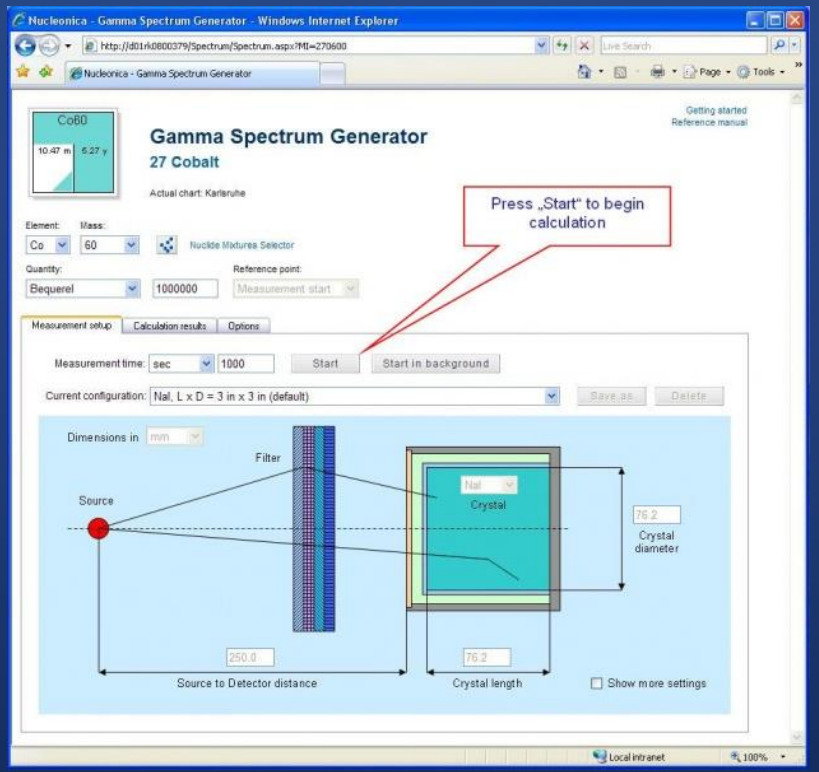
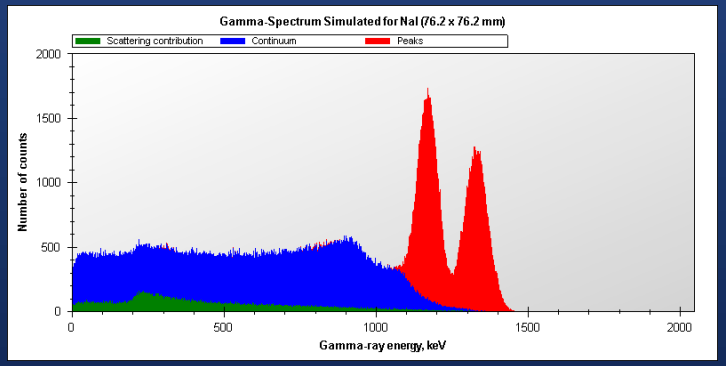
Validated Nuclear Science Applications & Tools

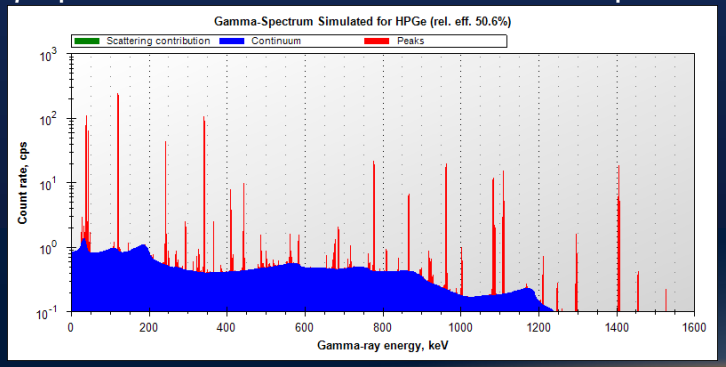
# Gamma Spectrum Generator

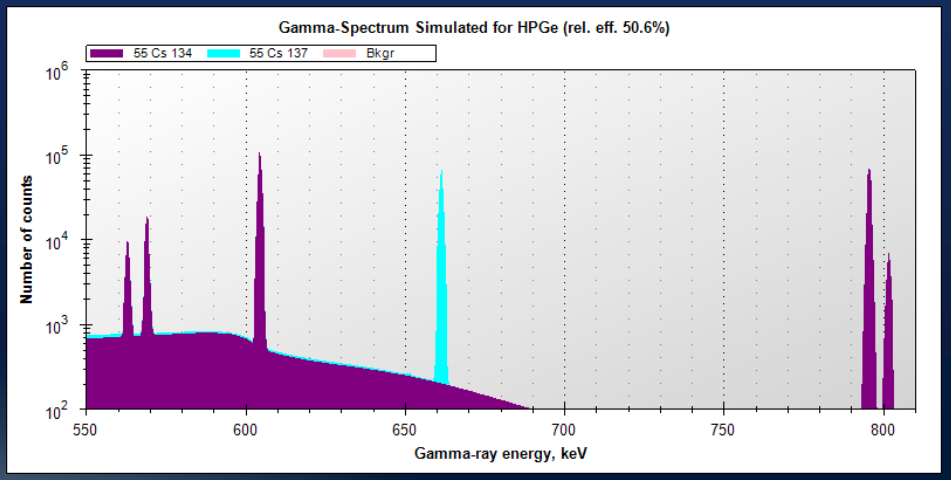



*γ*-spectrum simulated for $^{60}$Co 100 kBq source and NaI (3" × 3") detector:




*γ*-spectrum simulated for $^{152}$Eu 100 kBq source and HPGe detector.




Fukushima: Gamma spectrum of contamination at the Daiichi plant.
Contamination is almost entirely to cesium-137 and cesium -134

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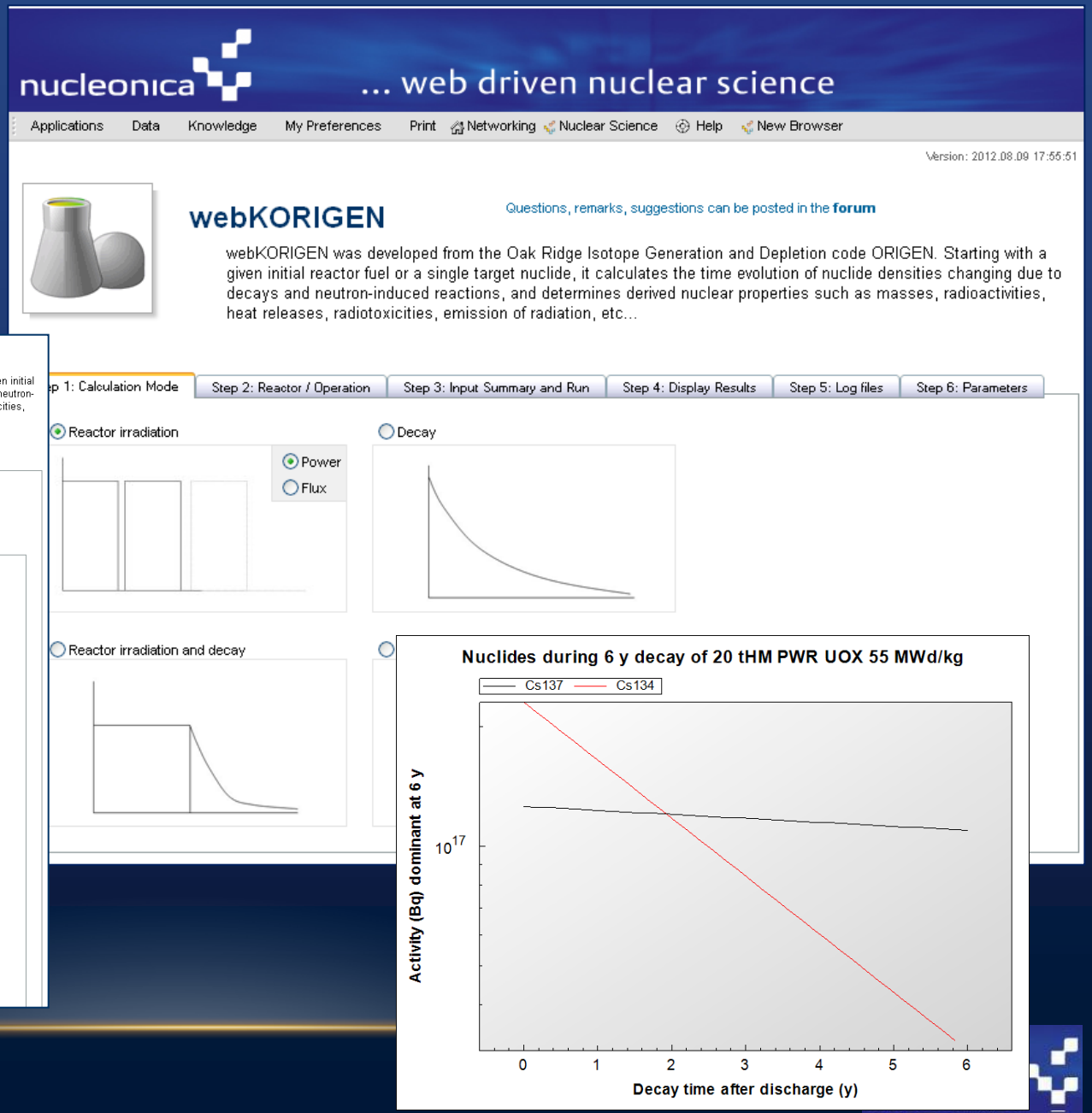
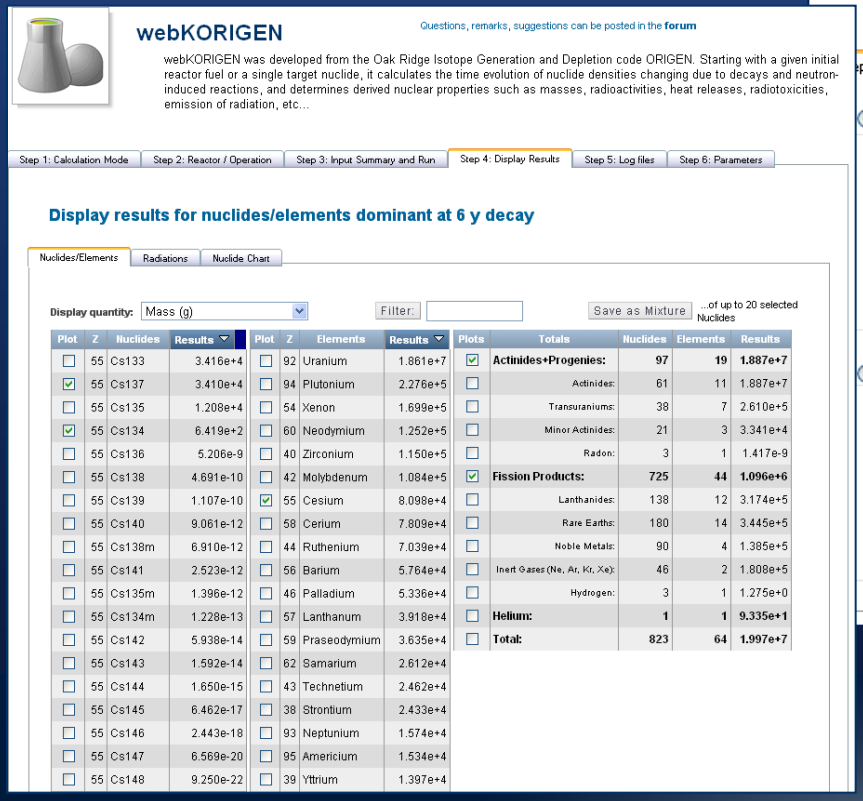
# Validated Nuclear Science Applications & Tools

## webKORIGEN

fuel depletion calculations
& neutron activation



# Validated Nuclear Science Applications & Tools

# e-Ship:

## package classification for radioactive transports

nucleonica ... web driven nuclear science

Applications | Data | Knowledge | My Preferences | Print | Networking | Nuclear Science | Help | New Browser Tab | Logout

### e-Ship++

**radiological transport assistant**

This is a *beta* version of the new web application *e-Ship++*.
Please report errors to info@nucleonica.com.

DISCLAIMER: this tool is a help to choose the package classification, please always refer to the country specific regulations.

My Packages | Edit | Options | Decay | Import | Activity limits | Swiss RPO | Sample packages | About e-Ship

**User defined transport packages**

| Package Name | Mass (g) | Items | Content | Form | State | Activity reported | last modified | Download | Delete |
|---|---|---|---|---|---|---|---|---|---|
| *(Create, import a new package)* | | | | | | | | | |
| 1g irradiated UOX fuel | 1 | | Material | Other | Solid | 2013.08.01 08:12:23 | 2013.08.01 08:12:23 | | |
| ISOLDE Target | 25000 | | Material | Other | Solid | 2013.04.14 17:28:38 | 2013.04.15 09:14:00 | | |
| Decayed: Sr83 | 1 | | Material | Other | Solid | 2013.04.11 16:50:25 | 2013.04.11 16:53:37 | | |
| Spectro | 1 | | Material | Other | Solid | 2012.01.06 08:00:00 | 2012.08.22 13:11:36 | | |
| Irradiated sample using 26 GeV protons | 1 | | Material | Other | Solid | 2012.05.24 08:00:00 | 2012.08.22 12:35:15 | | |
| Irradiated sample (iron) | 1 | | Material | Other | Solid | 2012.02.27 08:00:00 | 2012.08.22 11:46:31 | | |
| Simple Package (Excepted) | 1 | | Material | Other | Solid | 2012.08.10 08:00:00 | 2012.08.22 11:23:31 | | |
| My 1st Package (Type A) | 5 | | Material | Other | Solid | 2012.08.03 08:00:00 | 2012.08.22 11:15:18 | | |
| My 1st Package (Excepted) | 10 | | Material | Other | Solid | 2012.08.02 08:00:00 | 2012.08.22 11:13:16 | | |
| My 1st Package (Exempted) | 150 | | Material | Other | Solid | 2012.08.01 08:00:00 | 2012.08.22 11:02:28 | | |
| Total: 10 | | | | | | | | | |

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### e-Ship: nuclear material transport report

Transport report generated for source: Irradiated sample (iron) by iss1 iss1 on Aug 21, 2013 11:24:31
DISCLAIMER: this tool is a help to choose the package classification, please always refer to the country specific regulations

**Package name:** Irradiated sample (iron)
**Description:** Package created from CERN spectrum file. The activity was reported on 27.2.2012.

**Package characterisation:** Material, Other form, Solid
**Host material mass:** 1 g
**Activity reported:** Feb 27, 2012 08:00:00

*Please take care of subsidiary risk.*
**Chemical form:**
For the definition of the quantities used in this report see the Nucleonica Glossary

#### Source characterisation

Data extracted from Swiss RPO, Appendix 3, pages 65... from 1 January 2013.

| Nuclide | Half-life | Activity (Bq) | Heat (W) | Ambient dose rate $H_{10}$(μSv/h) at 10 cm | $E_{ing}$ (mSv) | $E_{inh}$ (mSv) | A(Bq) / LE(Bq) | A(Bq/kg) / LE(Bq/kg) | A(Bq) / LA(Bq) | Radioactive contents | Notes |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Be-7 | 53.22 d | 3.11e+4 | 2.48e-10 | 2.49e-2 | 8.71e-4 | 1.71e-3 | 7.78e-2 | 7.78e+1 | 3.11e-4 | (β/γ) | |
| Co-56 | 77.31 d | 1.86e+2 | 1.11e-10 | 9.02e-3 | 4.65e-4 | 1.25e-3 | 4.65e-2 | 4.65e+1 | 1.86e-4 | (β/γ) | |
| Co-57 | 271.80 d | 1.02e+3 | 2.34e-11 | 2.14e-3 | 2.14e-4 | 1.02e-3 | 2.04e-2 | 2.04e+1 | 1.28e-4 | (β/γ) | |
| Co-58 | 70.86 d | 7.22e+2 | 1.17e-10 | 1.06e-2 | 5.34e-4 | 1.52e-3 | 7.22e-2 | 7.22e+1 | 2.41e-4 | (β/γ) | |
| Co-60 | 5.271 y | 1.19e+2 | 4.95e-11 | 4.36e-3 | 4.05e-4 | 3.69e-3 | 1.19e-1 | 1.19e+2 | 1.32e-3 | (β/γ) | |
| Mn-54 | 312.13 d | 7.86e+2 | 1.06e-10 | 9.90e-3 | 5.58e-4 | 1.18e-3 | 7.86e-2 | 7.86e+1 | 1.97e-4 | (β/γ) | |
| Na-22 | 2.6027 y | 5.25e+4 | 2.00e-8 | 1.73e+0 | 1.68e-1 | 6.83e-2 | 1.75e+1 | 1.75e+4 | 1.75e-2 | (β/γ) | |
| Sc-46 | 83.79 d | 2.24e+2 | 7.60e-11 | 6.70e-3 | 3.36e-4 | 1.52e-3 | 3.20e-2 | 3.20e+1 | 2.24e-4 | (β/γ) | |
| Ta-182 | 114.7 d | 3.23e+2 | 7.75e-11 | 6.27e-3 | 4.85e-4 | 3.23e-3 | 4.61e-2 | 4.61e+1 | 4.61e-4 | (α) | |
| Y-88 | 106.63 d | 1.45e+2 | 6.27e-11 | 5.51e-3 | 1.89e-4 | 6.38e-4 | 1.81e-2 | 1.81e+1 | 7.25e-5 | (β/γ) | |
| **Total: 10** | | **8.71e+4** | **2.09e-8** | **1.81e+0** | **1.72e-1** | **8.40e-2** | **1.80e+1** | **1.80e+4** | **2.06e-2** | | |

#### Package characterisation

Data extracted from ADR Table of $A_1$, $A_2$ values, exemption limits and notes (pages 218...)

| Nuclide | Activity (Bq) | $A_2$ (TBq) | Exempt (Bq) | Exempt (Bq/g) | Excepted (GBq) | A / $A_2$ | A Exempt | A(Bq/g) Exempt(Bq/g) | A Excepted |
|---|---|---|---|---|---|---|---|---|---|
| Be-7 | 3.11e+4 | 2.00e+1 | 1.00e+7 | 1.00e+3 | 2.00e+1 | 1.56e-9 | 3.11e-3 | 3.11e+1 | 1.56e-6 |
| Co-56 | 1.86e+2 | 3.00e-1 | 1.00e+5 | 1.00e+1 | 3.00e-1 | 6.20e-10 | 1.86e-3 | 1.86e+1 | 6.20e-7 |
| Co-57 | 1.02e+3 | 1.00e+1 | 1.00e+6 | 1.00e+2 | 1.00e+1 | 1.02e-10 | 1.02e-3 | 1.02e+1 | 1.02e-7 |
| Co-58 | 7.22e+2 | 1.00e+0 | 1.00e+6 | 1.00e+1 | 1.00e+0 | 7.22e-10 | 7.22e-4 | 7.22e+1 | 7.22e-7 |
| Co-60 | 1.19e+2 | 4.00e-1 | 1.00e+5 | 1.00e+1 | 4.00e-1 | 2.98e-10 | 1.19e-3 | 1.19e+1 | 2.98e-7 |
| Mn-54 | 7.86e+2 | 1.00e+0 | 1.00e+6 | 1.00e+1 | 1.00e+0 | 7.86e-10 | 7.86e-4 | 7.86e+1 | 7.86e-7 |
| Na-22 | 5.25e+4 | 5.00e-1 | 1.00e+6 | 1.00e+1 | 5.00e-1 | 1.05e-7 | 5.25e-2 | 5.25e+3 | 1.05e-4 |
| Sc-46 | 2.24e+2 | 5.00e-1 | 1.00e+6 | 1.00e+1 | 5.00e-1 | 4.48e-10 | 2.24e-4 | 2.24e+1 | 4.48e-7 |
| Ta-182 | 3.23e+2 | 5.00e-1 | 1.00e+4 | 1.00e+1 | 5.00e-1 | 6.46e-10 | 3.23e-2 | 3.23e+1 | 6.46e-7 |
| Y-88 | 1.45e+2 | 4.00e-1 | 1.00e+6 | 1.00e+1 | 4.00e-1 | 3.63e-10 | 1.45e-4 | 1.45e+1 | 3.63e-7 |
| **Total: 10** | **8.71e+4** | | | | | **1.11e-7** | **9.39e-2** | **5.54e+3** | **1.11e-4** |

Package Exempt from regulation

This is a *beta* version of the new web application *e-Ship++*.
Please report errors to info@nucleonica.com.

DISCLAIMER: this tool is a help to choose the package classification, please always refer to the country specific regulations.

My Packages | Edit | Options | Decay | Import | Activity limits | Swiss RPO | Sample packages | About e-Ship

Name (ID=1203)
Irradiated sample (iron)
Chemical form (please take care of subsidiary risk):
Description:
Package created from CERN spectrum file.
The activity was reported on 27.2.2012.
Activity reported: 2012.02.27 08:00:00

Package characteristics
Content: Material / Instruments / Articles
Form: Other / Special
State: Solid / Liquid / Gas
Host material: 1 g

| Nuclide | Activity A (Bq) | Mass (g) | Half-life | $A_1$ (TBq) | $A_2$ (TBq) | Excepted (GBq) | Exempt (Bq) | Exempt (Bq/g) | A / $A_2$ | A Excepted | A (Bq) Exempt(Bq) | A (Bq/g) Exempt(Bq/g) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Be-7 | 3.11e+4 | 2.40e-12 | 53.22 d | 20 | 20 | 20.0 | 1.00E+07 | 1.00E+03 | 1.55e-9 | 1.55e-6 | 3.11e-3 | 31.1 |
| Co-56 | 186 | 1.66e-13 | 77.31 d | 0.3 | 0.3 | 0.300 | 1.00E+05 | 1.00E+01 | 6.20e-10 | 6.20e-7 | 1.86e-3 | 18.6 |
| Co-57 | 1.02e+3 | 3.27e-12 | 271.80 d | 10 | 10 | 10.0 | 1.00E+06 | 1.00E+02 | 1.02e-10 | 1.02e-7 | 1.02e-3 | 10.2 |
| Co-58 | 722 | 6.14e-13 | 70.86 d | 1 | 1 | 1.00 | 1.00E+06 | 1.00E+01 | 7.22e-10 | 7.22e-7 | 7.22e-4 | 72.2 |
| Co-60 | 119 | 2.84e-12 | 5.271 y | 0.4 | 0.4 | 0.400 | 1.00E+05 | 1.00E+01 | 2.98e-10 | 2.98e-7 | 1.19e-3 | 11.9 |
| Mn-54 | 786 | 2.74e-12 | 312.13 d | 1 | 1 | 1.00 | 1.00E+06 | 1.00E+01 | 7.86e-10 | 7.86e-7 | 7.86e-4 | 78.6 |
| Na-22 | 5.25e+4 | 2.27e-10 | 2.6027 y | 0.5 | 0.5 | 0.500 | 1.00E+06 | 1.00E+01 | 1.05e-7 | 1.05e-4 | 5.25e-2 | 5.25e+3 |
| Sc-46 | 224 | 1.79e-13 | 83.79 d | 0.5 | 0.5 | 0.500 | 1.00E+06 | 1.00E+01 | 4.48e-10 | 4.48e-7 | 2.24e-4 | 22.4 |
| Ta-182 | 323 | 1.40e-12 | 114.7 d | 0.9 | 0.5 | 0.500 | 1.00E+04 | 1.00E+01 | 6.46e-10 | 6.46e-7 | 3.23e-2 | 32.3 |
| Y-88 | 145 | 2.81e-13 | 106.63 d | 0.4 | 0.4 | 0.400 | 1.00E+06 | 1.00E+01 | 3.62e-10 | 3.63e-7 | 1.45e-4 | 14.5 |
| Total: 10 | 8.712e+4 | 2.409e-10 | | | | | | | 1.11e-7 | 1.11e-4 | 9.39e-2 | 5.54e+3 |

Element: Y | Mass: 88 | Property | Quantity: 145 | Unit: Becquerel | Update

Save Package | Reset | Cancel | Report

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Education & Training with Nucleonica

# Nucleonica for Smartphones: and Tablet PCs: M-Learning





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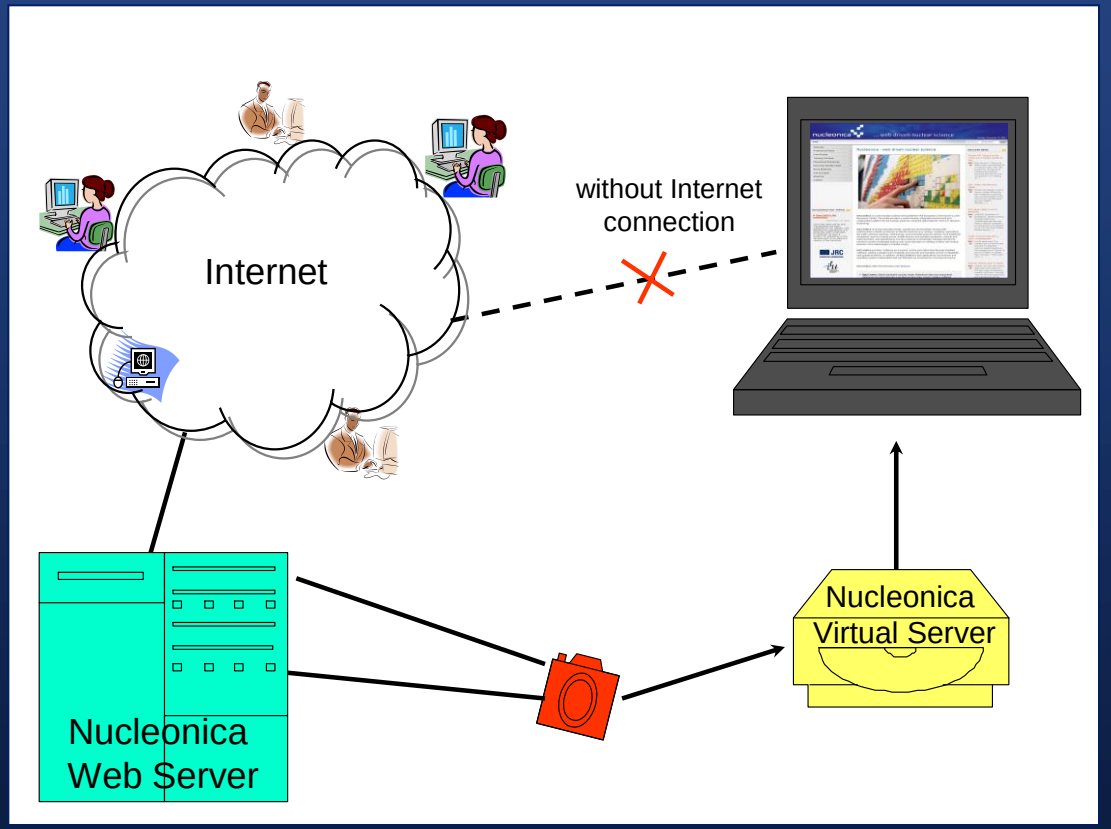
# Standalone version of Nucleonica

- specially developed for mobile labs and field workers or for use on Notebooks/PCs where an internet connection cannot be guaranteed
- faster than internet version
- allows for more particles in Monte Carlo calculations than the internet version
- allows Monte Carlo dosimetry and shielding calculations (provided you have an MCNP license!)



Education & Training with Nucleonica

# Karlsruhe Nuclide Chart

- Fold-out Chart
- Wall-Chart
- Auditorium Chart
- Nuclide Carpet





Nuclide „carpet“
1m x 6.5m

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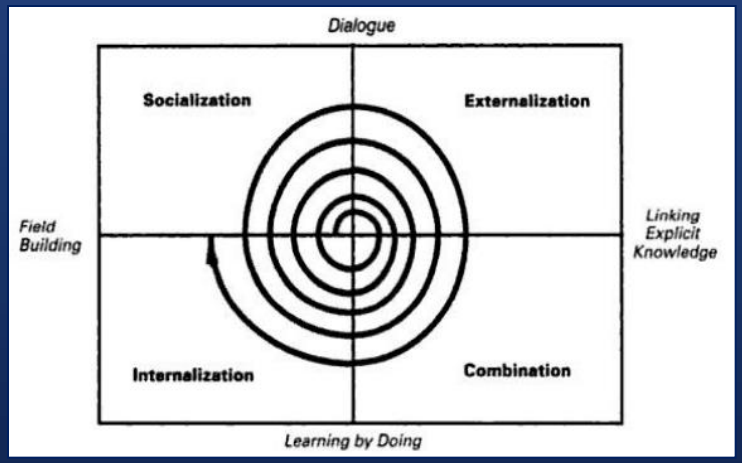
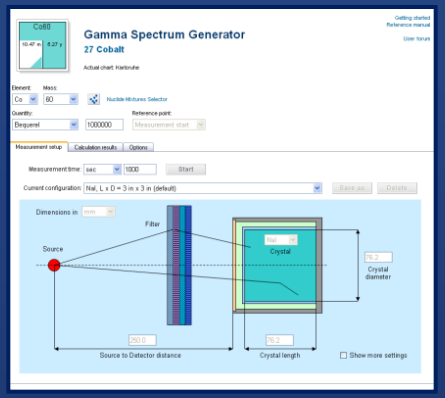
# Knowledge Management with Nucleonica

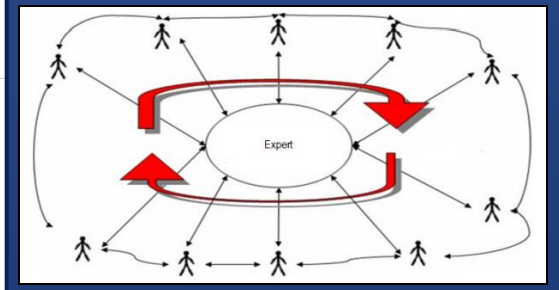
In this slide, the Nucleonica web portal is considered from a knowledge management perspective. Nonaka and Takeuchi have proposed the “knowledge spiral” (shown) in which there are four modes of knowledge conversion: socialization, externalization, combination and internalization (SECI model).




**Socialisation**: conversion of tacit knowledge to tacit knowledge e.g. an apprentice who works with tutor and learns from observing and imitating the tutor's actions. **Externalization:** conversion of tacit to explicit knowledge. **Combination** is the conversion of explicit to explicit knowledge. The process of systemizing already explicit knowledge into a knowledge system. **Internalization** is the conversion from explicit to tacit, which is closely related to “learning by doing”. At the end of the spiral process, one or more individuals in the organisation have acquired new tacit knowledge.

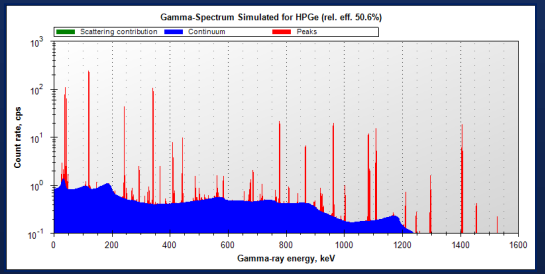



Socialisation: conversion of tacit knowledge to tacit knowledge




Externalization: conversion of tacit to explicit knowledge


Combination: systemizing explicit knowledge




Internalization: conversion from explicit to tacit, triggered through “Learning by Doing”.

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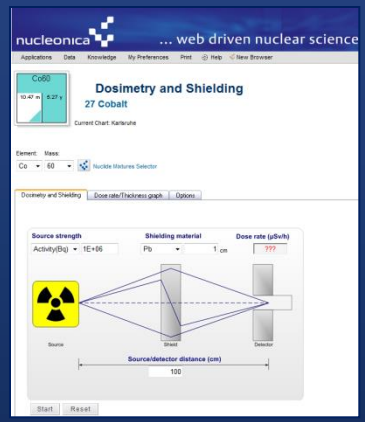
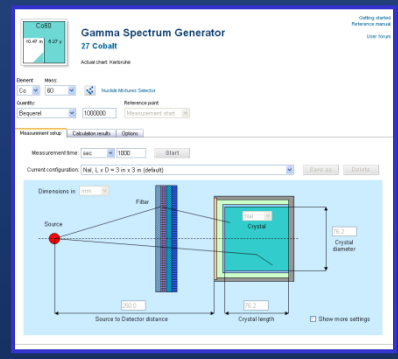
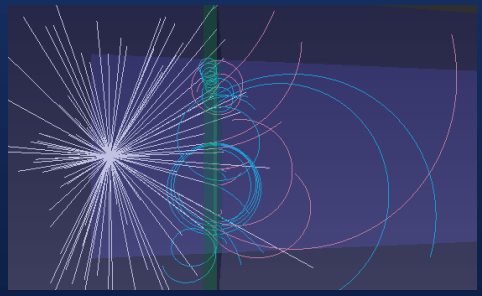
# Nucleonica: Web-based Software Tools for Simulation and Analysis

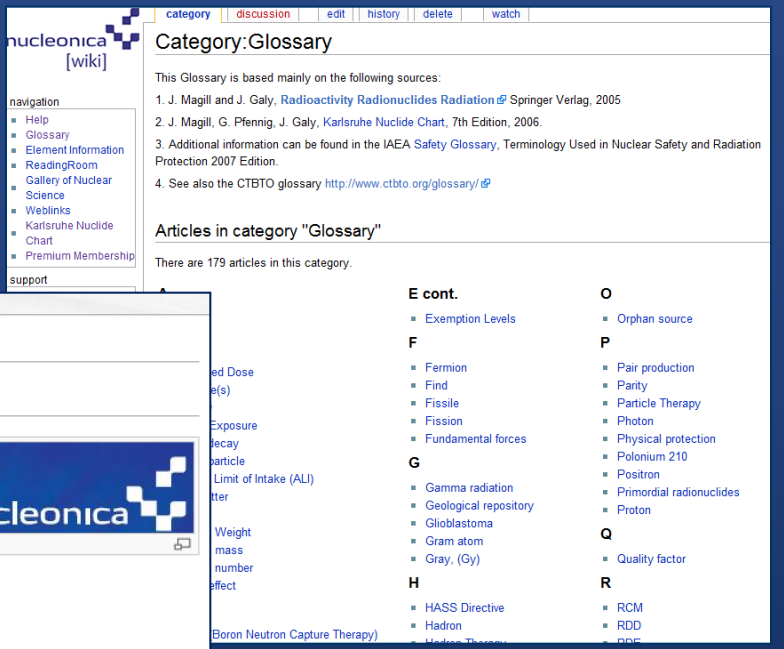
- Nuclear Data Resources in Nucleonica
- Nuclear Science Applications & Tools
  - Decay Engine
  - Dosimetry & Shielding
  - Virtual Cloud Chamber
  - Gamma Spectrum Generator
  - webKORIGEN
  - *e*-Ship
- Education & Training with Nucleonica
  - Nucleonica Mobile
  - Karlsruhe Nuclide Chart
- Knowledge Management with Nucleonica

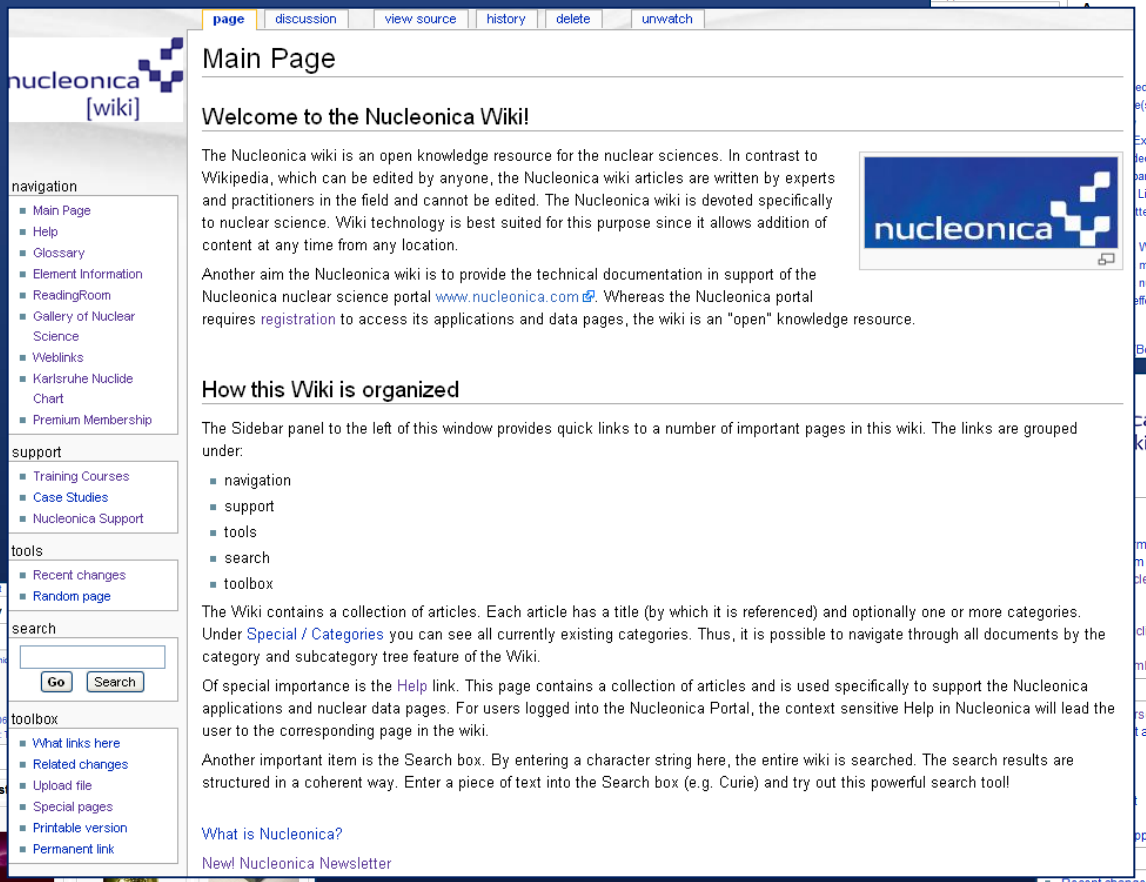


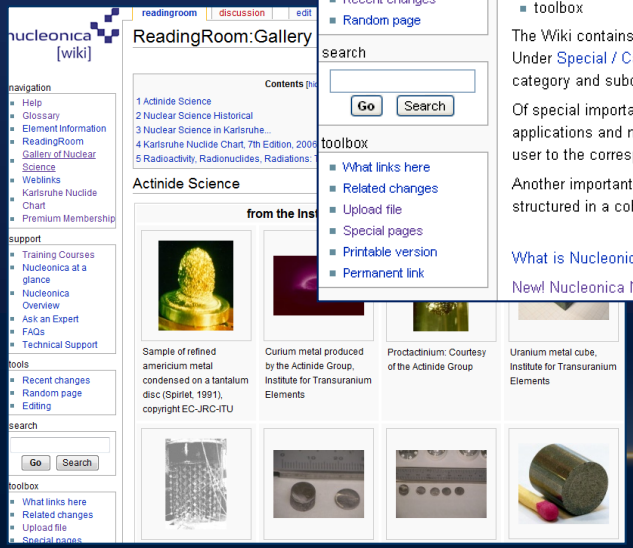



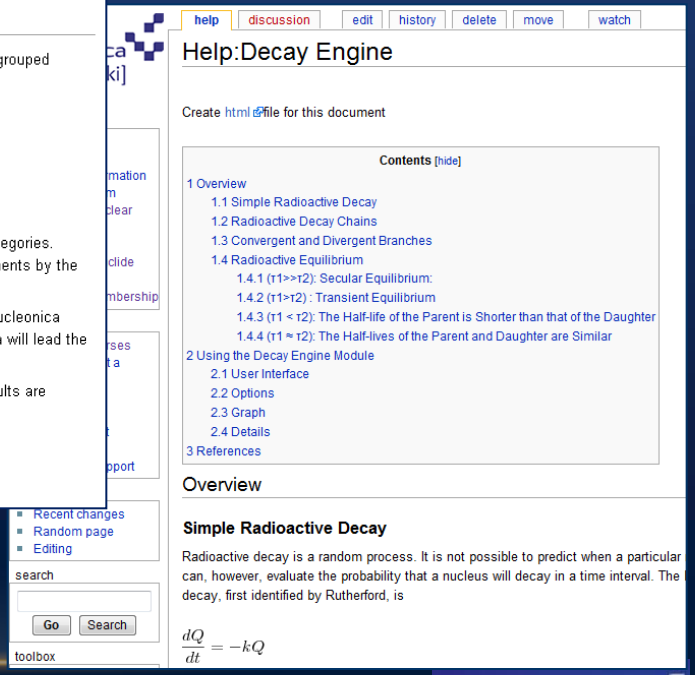



# The Nucleonica Wiki…

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The Nucleonica Blog…

# Start of the Name Approval Process for the Elements of Atomic Number 114 and 116

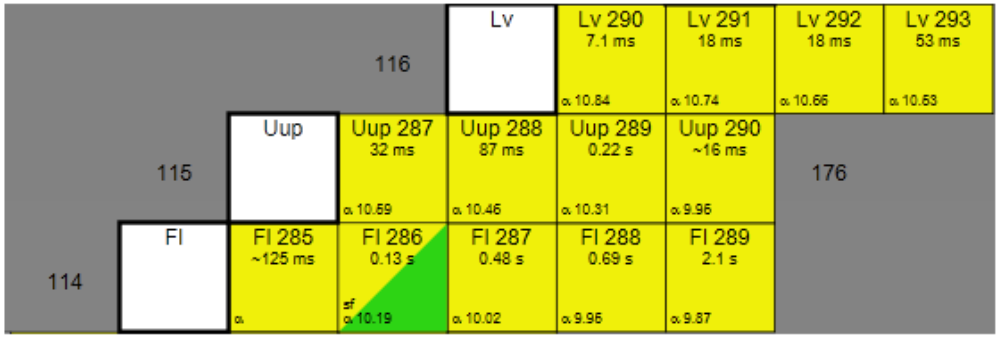
February 19th, 2012

by Joseph Magill

A joint IUPAC/IUPAP Working Party (JWP) has confirmed the discovery of the elements with atomic numbers 114 and 116. In accord with IUPAC procedures, the discoverers proposed names as follows: flerovium and symbol, Fl, for the element with Z = 114 and livermorium with the symbol Lv for the element with Z = 116. The Inorganic Chemistry Division recommended these proposals for acceptance.

Comments should be submitted by 30 April 2012. The text of the Provisional Recommendation can be downloaded from http://media.iupac.org/reports/provisional/abstract11/corish_300412.html.

Comments should be sent to Prof. John Corish at jcorish@tcd.ie.




Extract from the new 8th Edition (2012) of the Karlsruhe Nuclide Chart showing the isotopes of flerovium and livermorium.

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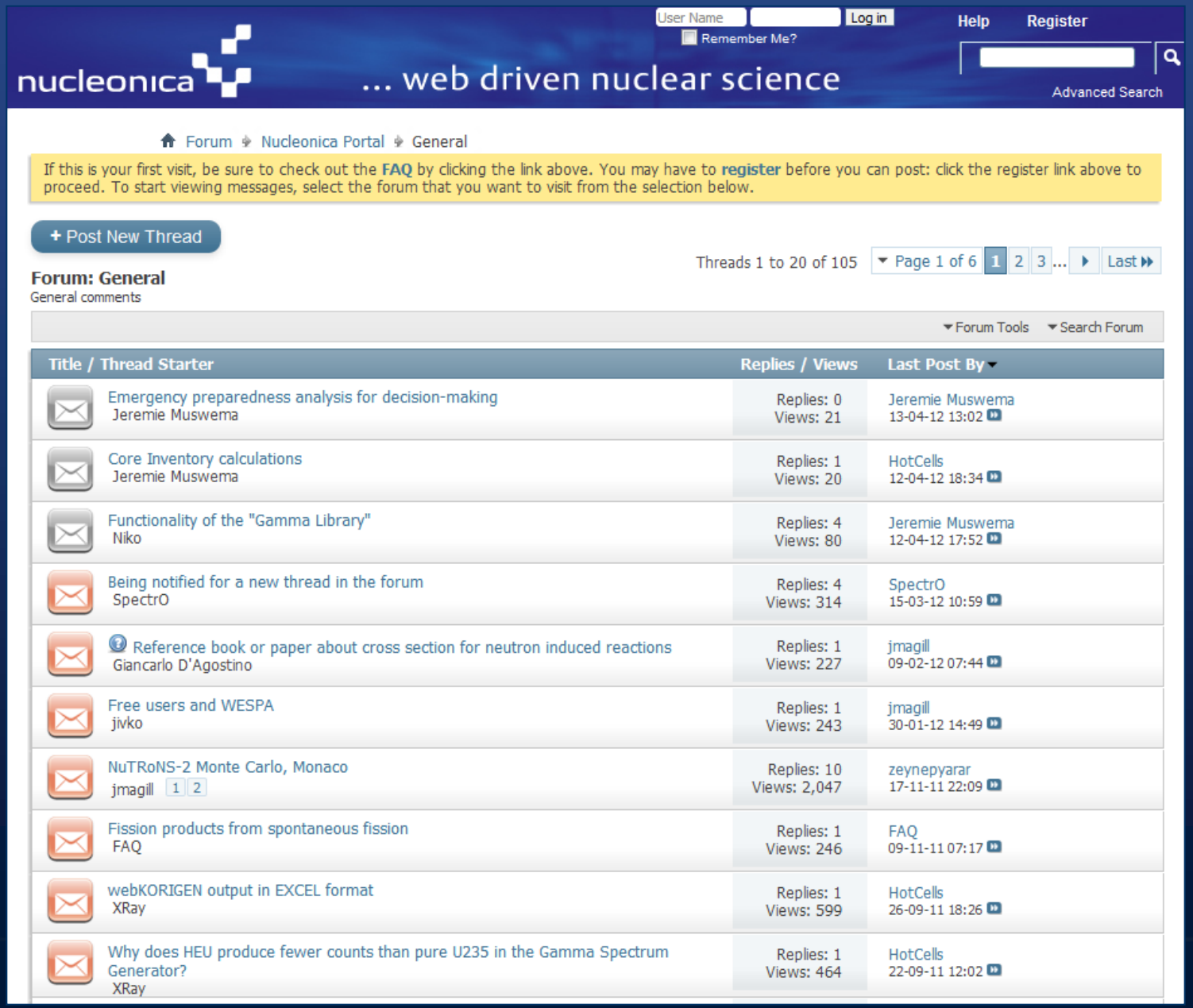
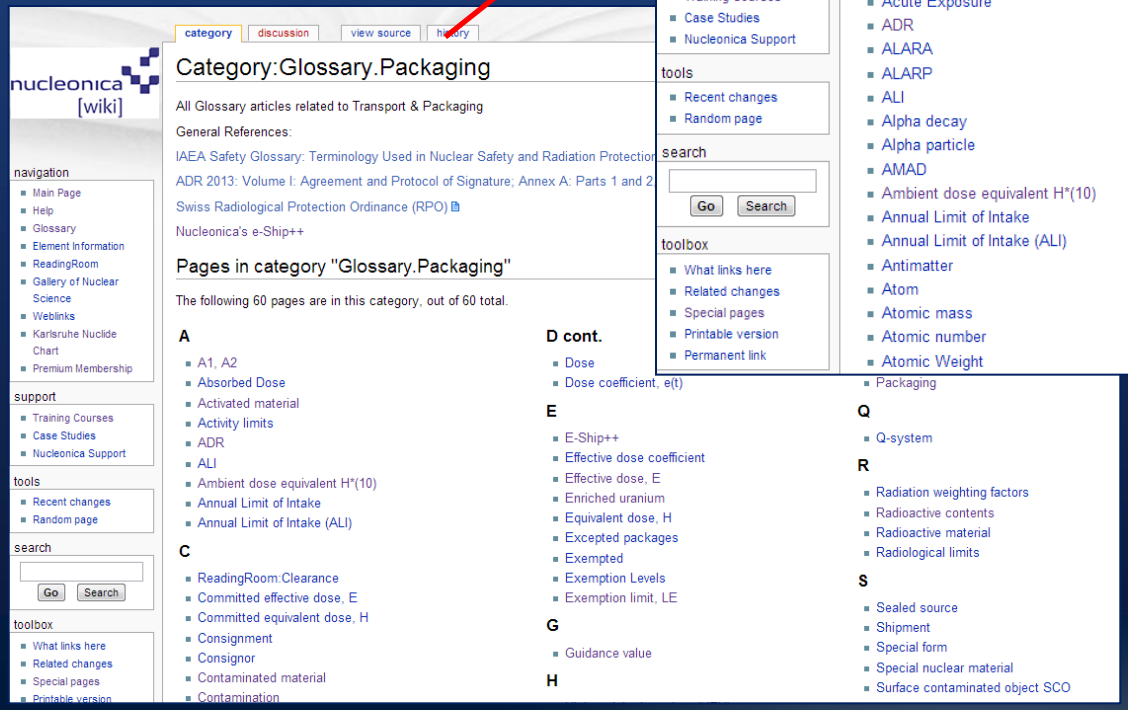
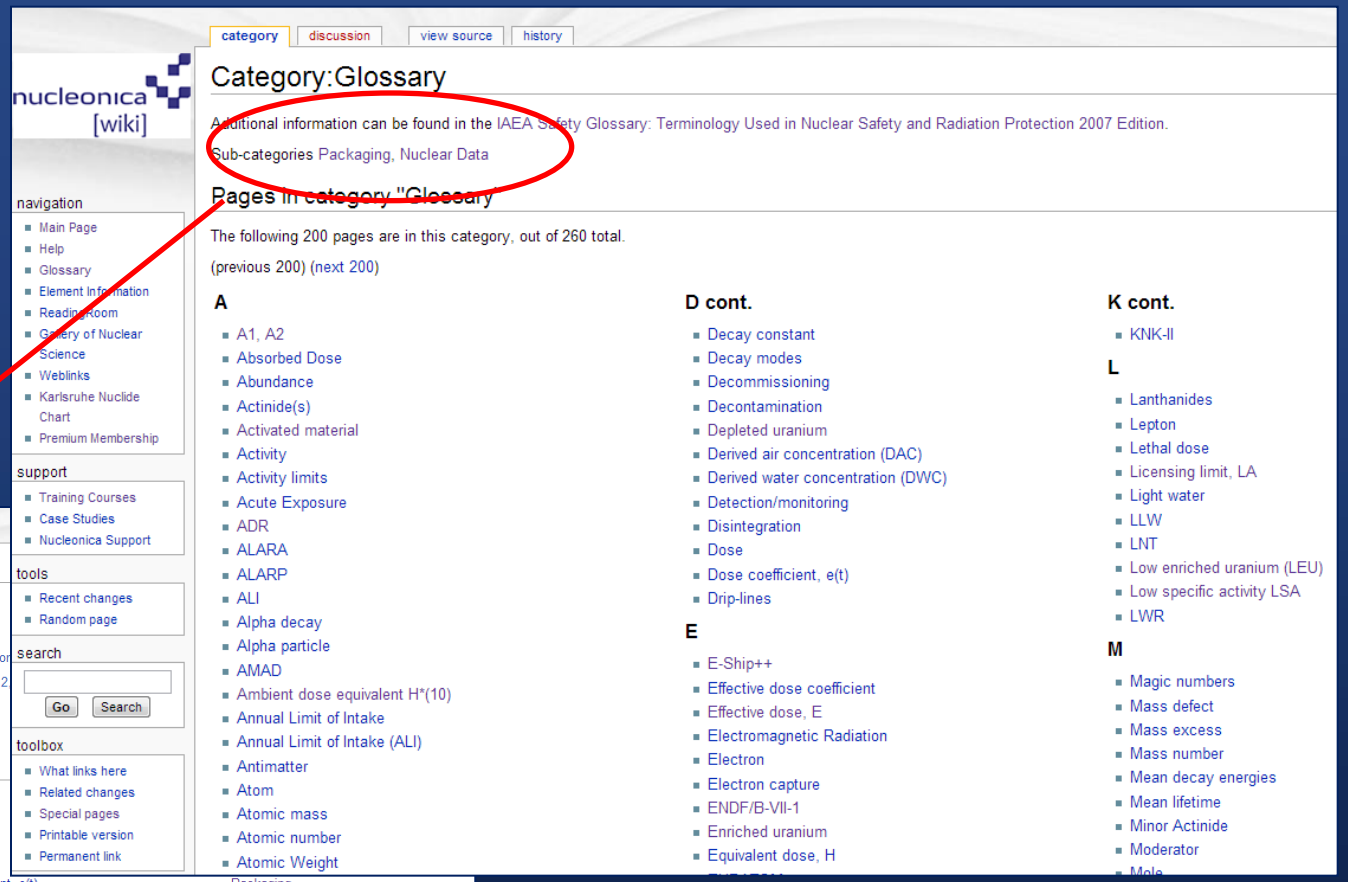
# The Nucleonica Forum…



# The Nucleonica Glossaries…

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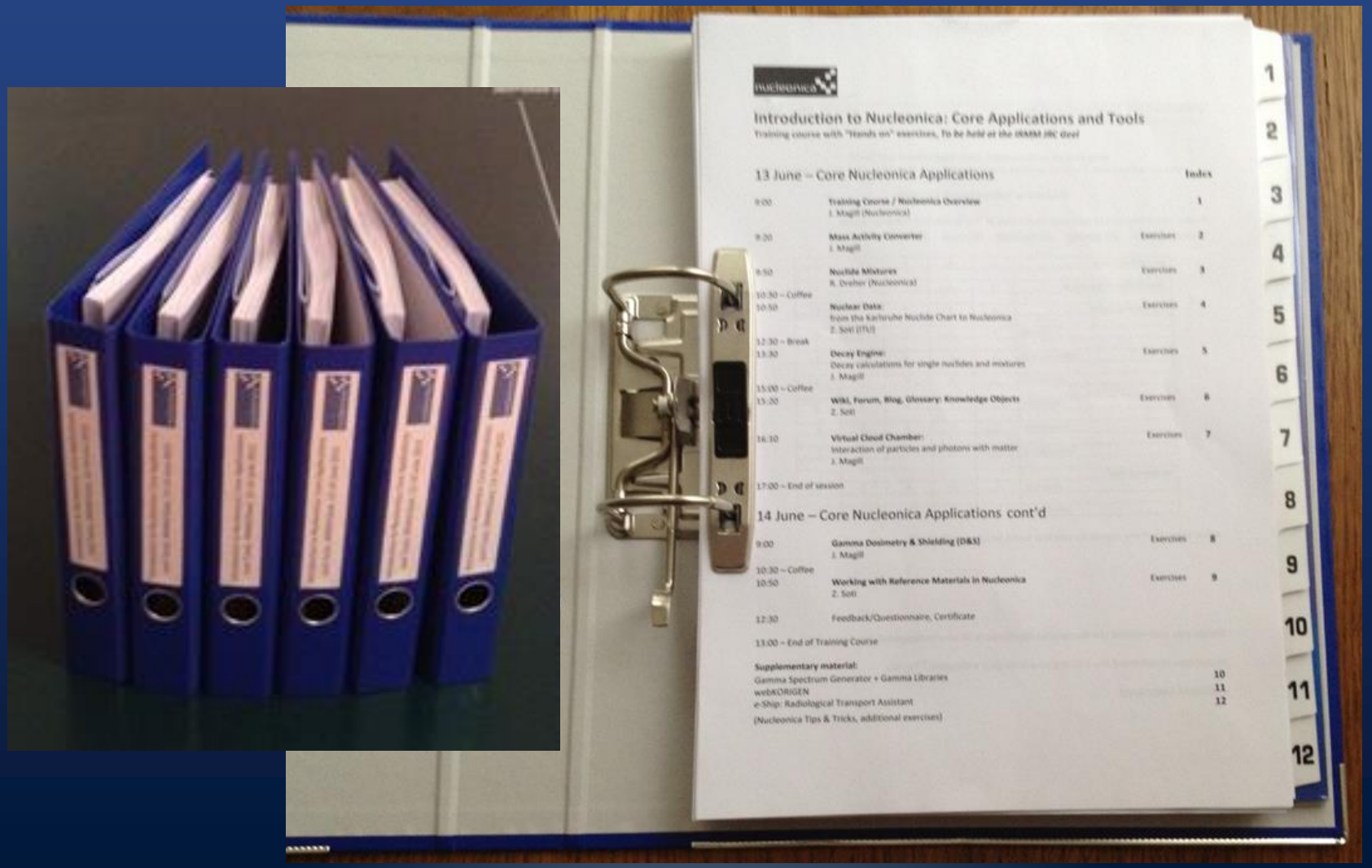
# Training courses...

# Course Folders…



# Nucleonica: Basic, Core and Advanced Applications

Training course with "Hands on" exercises, *To be held at the IRMM JRC Geel, Belgium*

## 3 Oct. – Basic & Core Nucleonica Applications

| | | | Index |
|---|---|---|---|
| 9:00 | **Training Course / Nucleonica Overview**<br>J. Magill (Nucleonica) | | 1 |
| 9:30 | **Mass Activity Converter**<br>J. Magill | Exercises | 2a |
| 10:00 | **Nuclide Mixtures**<br>R. Dreher | Exercises | 2b |
| 10:30 – Coffee | | | |
| 10:50 | **Participants introduction** | | |
| 11:15 | **Nuclear Data**: from the Karlsruhe Nuclide Chart to Nucleonica, Z. Soti (ITU) | Exercises | 3 |
| 12:30 – Break | | | |
| 13:30 | **Decay Engine**<br>J. Magill | Exercises | 4 |
| 15:00 – Coffee | | | |
| 15:20 | **Virtual Cloud Chamber**<br>J. Magill | Exercises | 5 |
| 16:00 | **Gamma Dosimetry & Shielding (D&S)**<br>J. Magill | Exercises | 6 |
| 17:00 – End of session | | | |

## 4. Oct. – Advanced Nucleonica Applications

| | | | |
|---|---|---|---|
| 8:30 | ***e*-Ship: Radiological Transport Assistant**<br>Y. Donjoux (CERN) | Exercises | 7 |
| 10:00 – Coffee | | | |
| 10:20 | **webKORIGEN: nuclide depletion calculations**<br>J. Zsigrai (ITU) | Exercises | 8 |
| 11:20 | **Gamma Spectrum Generator**<br>J. Zsigrai | Exercises | 9a |
| 12:30 – Break | | | |
| 13:30 | **Gamma Libraries**<br>J. Zsigrai | Exercises | 9b |
| 14:30 | **Wiki, Forum, Blog, Glossary: Knowledge Objects**<br>Z. Soti | Exercises | 10 |
| 15:00 – Coffee | | | |
| 15:20 | **Working with Reference Materials in Nucleonica**<br>Z. Soti | Exercises | 11 |
| 16:00 | **Nucleonica Tips & Tricks**<br>J. Magill | | |
| 16:15 | Feedback/Questionnaire, Certificate | | |
| 16:30 – End of Training Course | | | |
| Supplementary material (additional exercises) | | | 12 |

**Forthcoming training courses…**

Oct. 2013: Nucleonica - Basic, Core and Advanced Applications
*To be held at the IRMM JRC Geel, Belgium*

Oct. 2013: Introduction to Nucleonica - Core Applications and Tools,
*to be held in CERN, Switzerland*

Nov. 2013: Nucleonia for New comers
*to be held at Insitute for Transuranium Elements, Karlsruhe*

Nov. 2013: Nucleonica for Nuclear Security
*to be held at the Federal Office for Radiaton Protection (BfS), Berlin*

April 2014: Introduction to Nucleonica - Core Applications and Tools,
*to be held in KIT/FTU, Karlsruhe*

*For more information see our webpage…*
http://www.nucleonica.com/wiki/index.php/Category:Training

We can also arrange a dedicated Nucleonica training course for your organisation…

Contact us at
info@nucleonica.com

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# Thank You!